OBITUARY NOTICES

OF

FELLOWS DECEASED.

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Sydney Rungu

SYDNEY RINGER, 1835—1910.

SYDNEY RINGER, who died at Lastingham, in Yorkshire, on October 14, 1910, was the son of John and Harriet Ringer, of Norwich, where he was born in 1835. He was educated at private schools, and at the age of 19 entered, as a medical student, University College, London, with which institution he was to remain connected during the remainder of his active life. At the hospital connected with that school he was successively House Physician, Resident Medical Officer (1861), Assistant Physician (1863), full Physician (1866), and Consulting Physician (on his retirement in 1900); and in the Faculty of Medicine of University College he held successively the chairs of Materia Medica and Therapeutics, of Medicine and of Clinical Medicine. The School of Medicine with which Ringer was associated has produced many distinguished clinicists, but it may be safely affirmed that it has produced no better clinical teacher than the subject of this memoir. It was not, however, on the ground of his clinical reputation that Ringer was elected a Fellow of the Royal Society, and it is not in the notices of this Society that his eminence as a clinicist need be accentuated. For Ringer was more than a great physician, much as that may mean: he was a scientific enquirer. His bent in that direction showed itself early, for even while still a student of medicine he presented a paper to the Royal Society, "On the Alteration of the Pitch of Sound by Conduction through different Media," and others to the Royal Medical and Chirurgical Society on Metabolism in Disease. These were followed by an investigation (conducted jointly with A. P. Stuart) into the diurnal variations of temperature in the human body, which was, however, not published in full until 1878. The subject of this enquiry, from its bearing on the variations of temperature in fever, never lost interest for him. But his appointment to the chair of Materia Medica and Therapeutics directed his attention towards the action of medicinal substances and agencies. His experiences of their action on the human body he embodied in his well-known 'Handbook of Therapeutics,' of which a very large number of editions have appeared; no more thoroughly practical handbook of treatment has probably ever been written. Ringer, however, recognised that it is necessary for the understanding of the action of remedies in disease for their action in health first to be determined, and that, to comprehend their effects upon the body generally, their influence upon the individual organs and tissues must be understood. There was then no laboratory of pharmacology in London, but he found the opportunity for carrying out researches of this nature in the Physiological Laboratory of University College, where a place was always at his disposal. Here, in the intervals of a busy consulting practice, he carried out the remarkable series of researches on the action of

various salts upon the tissues, and especially upon the muscular tissue of the heart, which resulted in the recognition of the influence exerted by simple inorganic constituents of the blood in maintaining the activity of the living tissues—an influence which had remained obscure, in spite of the elaborate series of researches of the same nature which were conducted in the famous Physiological Laboratory of Leipzig and elsewhere.

Ringer was the first to show that a solution containing certain ions (chlorine, sodium, calcium, and potassium), in the form of inorganic salts in definite proportions, provides a fluid which can completely replace the ordinary blood of an animal in so far as the activation of the living tissues is concerned, and that the presence of these ions or others of similar nature is necessary for such activation. Such a fluid is now in general use in physiological laboratories and is known as "Ringer's solution."

Later he extended these researches to embrace the action of the same salts upon the heat-coagulation of proteins and upon ferment-actions such as those producing the clotting of blood and the curdling of milk. Above all he was instrumental in discovering the important part which calcium plays in most of these processes. He also carried out numerous investigations into the action of special drugs, such as veratrine, muscarine, pilocarpine, and aconitine, and was the first to investigate the direct action of anæsthetics upon cardiac tissue. Some of these researches were conducted with the aid of fellow-workers, many of whom have since obtained distinction in the medical profession.

Ringer was elected a Fellow of the Royal Society in 1885.

His methods were of the simplest and were but little varied. For registering the effects of salts and drugs upon the heart he employed Roy's tonometer; their effects on skeletal muscle were recorded by the ordinary student's myograph; their effects on blood-vessels by adding some of the drug to the fluid employed for perfusion and counting the drops which passed through the vessels in a given time. He used for these investigations the tissues of the frog, rarely, if ever, employing mammals. Even if he had desired to carry out experiments on the higher animals, it would have been difficult for him to find enough time. His scientific work was done between breakfast and the commencement of his private practice, which could give him at most a couple of hours a day; this was sometimes supplemented by a visit to the laboratory in the late afternoon. Clinical medicine was his profession, scientific research was his recreation. As he himself would have been the first to admit, in science he was an amateur. But, we may justly add, the sort of amateur who produces better work than that of many a professional!

His period of greatest activity is contained between the years 1875 to 1895. During this time he published—for the most part in the 'Journal of Physiology'—a succession of papers on the various subjects which have been above indicated.

No notice of Sydney Ringer would be complete without reference to the personal qualities which characterised him. His upright carriage, open, frank countenance, and animated movements found their counterparts in mental characteristics which were equally typical. In disposition he was the most modest of men, and it was with difficulty that he was induced to allow his name to be proposed for the Fellowship of the Royal Society, although his friends were well aware that his selection would follow as a matter of course.

Although holding decided views on social and religious questions, he never allowed them to be obtrusive. The generosity of his nature and the kindliness of his disposition were exemplified in many ways, and in numerous instances the persons whom he assisted never knew the name of their benefactor.

He is laid to rest in the churchyard of Lastingham, at the edge of the Yorkshire moors, by the side of his beloved wife and of a daughter, early lost to them, in remembrance of whom her parents restored the beautiful old village church. His memory is cherished by his friends and honoured by physiologists throughout the world.

E. A. S.

SIR RUBERT BOYCE (1863—1911).

THE death of Sir Rubert Boyce in June last at the age of forty-eight came as a shock to many. He was born on April 22, 1863, in London, and London was his early home, but his parentage was Irish. His father, Robert Henry Boyce, of Carlow, was an engineer, at one time Principal Surveyor of H.M. Diplomatic and Consular Buildings in China. His mother was a daughter of Dr. Neligan, a medical practitioner of eminence, in Athlone. Boyce's trend toward natural science began early. Sent to a preparatory school at Rugby, he there acquired a practical knowledge of botany, amplified during his holidays in London by microscopic work with his parents' friend Mr. Hurst, a member of the Quekett Microscopical Club and author of a handbook on surveying. Later he was at school at Paris, where his aunt, Miss Henrietta Boyce, was then resident. It seems that during his boyhood he picked up knowledge of several handicrafts—carpentry, mason's work, plumber's and glazier's fitting. To these latter he would turn on occasion in after years as the nearest things to recreation not ennuyant to him.

He entered on the study of medicine, his place of studentship being University College, London. In 1888 he obtained the diplomas of the Royal

Colleges of Physicians and Surgeons, and in the following year the degree of M.B. of the University of London. He never proceeded to the full doctorate. He was not one who attached much weight to formal examination results. Moreover, in later years he would go out of his way to tell friends that the University system in force in the metropolis in his day had never given him an *alma mater*.

After obtaining his degree he became an assistant in the Pathological Laboratory under Professor Victor Horsley, at University College. There his energy and ability soon showed. In 1892 he was appointed Assistant-Professor of Pathology. He contributed conspicuously to the large output of research from the laboratory, and he issued a text-book of Morbid Histology, a volume of 400 pages. The book was never very popular with students. It was probably too original for them. Its preface stated that in it "little stress was laid upon the ordinary methods of classification"; it was also full of excellent microphotographs, a class of illustration then novel of adoption for such a purpose.

In 1894 Boyce was appointed to the newly-endowed Chair of Pathology in the young University College of Liverpool. He threw himself at once into the task of organising a laboratory of scientific Pathology on modern lines. His laboratory quickly became a centre for workers attracted by and sharing his enthusiasm. Much valuable research issued from it. Greatly though his laboratory absorbed him and flourished, problems concerning the University College as a whole began to occupy him even as much or more. On the College Senate he became a force urging towards development and expansion. His activity in this direction soon passed beyond the immediate circle of the Senate and its routine business. He embraced every opportunity, public or private, to make his voice heard as a preacher of ampler University activity. It was soon evident that he could make others, even those engaged in pursuits seemingly alien and remote from his own, listen; he won their sympathy and support. An early success he achieved may be cited as illustrating his character and policy. In his view the College was *de facto* a University; he also realised that an immensely increased sphere for public preventive medicine was at hand. He urged it as the duty of, and opportunity for, the College to take up vigorously forthwith the teaching of hygiene, technically, practically, and yet scientifically, to all in the community entering on its practice, even in its humbler aspects—sanitary inspectors, meat inspectors, builders, and plumbers. To the academic body this did not greatly appeal; its apathy chilled Boyce little. Unsupported, he went outside to laymen; to them he presented a scheme with convincing capacity and persuasiveness. Almost at once he obtained the gift of two houses adjoining the University College, their remodelling and equipment as a laboratory and museum, and a subvention for their maintenance as such. The Lord Mayor opened the School of Hygiene formally, and the University College itself looked on with surprise at its own enrichment and the expansion of its scope. This, Boyce's first appearance as a local public force, was

significant of much in his further career. It revealed his boldness and shrewdness of appeal for University aims to a non-University public, and his ideal of a University life dovetailed by public utility into the life of a civic community.

Looking back to that time, we know now that a wave of University development was then, in fact, imminent in the country. And we know that Liverpool proved one of the chief centres of its motive force; in that centre Boyce was eminent as a forceful and practical spirit. In Liverpool the problem naturally presented itself particularly as that of enlarging and freeing the University College to a fully-equipped and self-centred University. The College at Liverpool, together with similar colleges in Manchester and Leeds, was nominally centred outside Liverpool at Manchester. This conglomeration Boyce felt should be broken up. At Liverpool within the academic body itself diffidence opposed such a departure. In the outside community indifference and want of appreciation of the issue had to be removed. Caution urged "let well alone." Many even among those best disposed toward University projects feared that a large demand for further funds would fail or would deplete schemes already working and requiring steady upkeep. They thought that to undertake such wide new responsibilities would bring inability to meet adequately either the new or the old. To all such fears Boyce's courage was deaf. His answer came less in words than in deeds. His energy and resource left no stone unturned in search for ways and means. Allying himself with a few colleagues, styled intimately "The New Testament," and chiefly of the Arts faculty, he with them started a University Club. Its housing and cuisine were almost ostentatiously Spartan, contrasting against the luxurious clubs of the commercial city. Its means at outset were of the most slender. Boyce's contributions were not the less valuable because they extended even to the house furnishing; as a capable bricklayer he built with his own hands a wall in the club yard. This club achieved its aim. Formed to consolidate the local University movement by bringing into close social relation men from inside and from outside the College circle itself, it became the rallying point for those ventures which culminated in the formation of the present University. Boyce was president of the club in one of its most eventful years.

In 1898 the Department of Pathology entered into occupancy of a fine building erected and equipped for it by the late Rev. S. A. Thompson-Yates. Almost at the same time Boyce was appointed bacteriologist to the Liverpool Corporation. The opportunities the new laboratory and the new post together opened to him were just such as his heart desired. The work particularly interested him; moreover, he saw himself and his laboratory serving as a substantial bond between the University College he so cherished and his adopted city of which he was so proud. In daily touch with the Municipality and the life of commerce and its leaders, he made friendships of lifelong endurance, and became conversant with ways and views novel to his experience. When in 1902 the movement for establishment of the University took final shape, his influence contributed with unique effect.

In a collective enterprise, where action and action interact, it is difficult to assign to individuals their respective measures of effect. But it is certain that to Boyce, as much as to any one person, the University movement in Liverpool owed success. After the actual institution of the University his labours for it still continued, multiplying rather than abating. Four endowed Chairs have owed creation largely to him, the Chairs of Bio-Chemistry, of Tropical Medicine, of Comparative Pathology, and of Medical Entomology, as well as the University Lectureship on Tropical Medicine.

In the meanwhile his position and experience as a bacteriologist led to his engagement on work of national scope. He was appointed a member of the Royal Commission on Sewage Disposal. Much of the research executed for this Commission was done in his laboratory, with the assistance of Dr. (now Professor) A. S. F. Grünbaum and Drs. Harriette Chick, Hill, and MacConkey. Later, in 1904, he became a member of the Royal Commission on Tuberculosis. On the day of his death he was to have given his signature to the final Report of that Commission.

In 1897 Boyce visited Canada with the British Association. He was a secretary to the section of Physiology. The meeting was at Toronto. This visit made a lasting impression on him. Closer union of the Dominion with the old country by ties of mutual help and understanding became with him a cherished ideal, and, as usual, he was not idle in regard to it. By his advice, Mr. William Johnston, of Liverpool, instituted a Fellowship in the University for young medical graduates from parts of the Empire outside the Three Kingdoms. The steady success of the occupants of this Fellowship, coming into the University from Canada and elsewhere, was an abiding pleasure to Boyce in all his after years.

His ardour for Imperial development found congenial application later when a letter reached the Faculty of Medicine from Mr. Chamberlain, then Colonial Secretary. The letter rehearsed the heavy toll on life and health taken by trade with the Tropics, a trade with which Liverpool as a port is deeply concerned. The letter urged that the School of Medicine at Liverpool might well establish a department devoted to the special study of tropical disease. It is no secret that at first the suggestion was not well received by the Faculty. Some regarded it as a rather presumptuous piece of official interference: already, a whole hour's lecture in the systematic course on medicine was entirely devoted to malaria. But Boyce's mind caught fire from the new proposal. He would do it himself if the Faculty would not. He would set apart rooms of his own, and, if need be, himself raise the money necessary. And on the task he embarked at once with his habitual energy. A public dinner in connection with the Royal Southern Hospital took place a little later. Boyce spoke to one of the toasts, and took opportunity to plead for the new cause. Sir (then Mr.) Alfred Jones was present. Sir Alfred used to relate with relish "before that dinner was over Boyce had a hundred pounds out of me." Co-operation thus began between two men of somewhat similar energy and kindred imagination. Their alliance tightened

and strengthened. It was broken only by Sir Alfred's untimely death in 1909. By them in conjunction was founded the Liverpool School of Tropical Medicine, now famous the world over. They launched its pioneer work of combatting the diseases of the Tropics. Boyce organised the scientific and technical part of the scheme; he also collected a large part of the funds. In a country where there are few or no governmental subventions the only course open is the familiar way of all the public charities. Boyce sometimes told his friends that when he died the word "cash" would be found written across his heart. But his indefatigable hunt for funds was pursued with considerable sense of humour. It often became a game wherein no one was more amused than the wealthy and generous man who, meaning to be close fisted, found he had subscribed handsomely. As time went on the care of the new school and consequently the exploration—one might almost say the exploitation—of tropical disease in general became the interest most absorbing Boyce. His history becomes largely a history of the school itself. An initial question had been the appointment of a Director. To the disappointment of sundry local hopes there was for Boyce's mind but one man possible, Major (now Professor Sir) Ronald Ross, then on his way home from India, discoverer of the mosquito-borne nature of malaria. Ross was secured, and the Directorship soon became, through Sir Alfred's generosity, an endowed University Chair. In 1901 commenced the series of expeditions sent by the School to tropical countries to investigate the diseases in their habitat there. In the first six years of its existence the School despatched no fewer than seventeen expeditions. Costly in life and money as these were, they were also rich in theoretical and practical results. Boyce pushed their prosecution with an unfailing optimism. In 1905 he himself went to the yellow fever outbreaks in New Orleans and British Honduras.

It was in September, 1906, that, in a period of strenuous work exceptional even for him, at Harrogate, where he wished to establish a sanatorium for patients from the tropics, Boyce was struck down by a paralytic seizure affecting his left side. He faced the disaster with a courage truly heroic. He never regained complete power in his arm and leg, but after twelve months he partially resumed work at the University. He evidenced some lack of emotional control, but his vivacity was unabated and his desire to be doing just as keen as ever. Partially cut off from other work he devoted himself unsparingly to the campaign, by that time become international, for securing a cleaner health bill for the Tropics. Invalid though he was, he visited the West Indies to report at the instance of the Government on yellow fever in 1909. West Africa for the same purpose he visited in the following year. Not content with official reports of these expeditions he set to work to impress the importance of tropical preventive medicine on the general public. The result was the publication in two short years of the books 'Mosquito or Man' and 'Health Progress and Administration in the West Indies.' Written in a clear style and addressed to the general reader, these set forth the bearing of recent biological discoveries on human

life and commercial prosperity in tropical communities. These books found an immediate sale. Of the former there have been three, of the latter two editions. In January of the present year he published a third volume, 'Yellow Fever and its Prevention'; this he dedicated to the late Sir Alfred Jones, "whose vivid imagination and great grasp of affairs stimulated the author to travel." Through these books and his other work Boyce's name, it is not too much to say, has become familiar to every European in the Tropics. The last completed of his projects was the formation, at Liverpool, of the Bureau of Yellow Fever. He finished the first number of its 'Bulletin,' and sent it to press only an hour before his final seizure.

On May 2 of the present year, while on his way to attend a meeting in London of the African Advisory Board, he was attacked with motor aphasia and slight paralysis of the right side. He returned to Liverpool, and, in the course of a few weeks, made considerable recovery. So soon as he felt better, no arguments could induce him to rest or forego his public calls. On June 7 he attended a banquet of the Tropical School held to welcome back his old friend Prof. Todd of Montreal and the other members of the Gambia Expedition, and to wish good-bye to Prof. Newstead, then starting for Uganda. Boyce responded to the toast of "Tropical Medicine and Commerce." A week later he had an apoplectic seizure; he lost and never regained consciousness; on the 16th he died.

He had married in 1901 Kate Ethel Johnston, a daughter of Mr. William Johnston, shipowner, of Liverpool, a munificent benefactor to the University. The Tropical School is housed in laboratories given by Mr. Johnston and bearing his name. Boyce lost his wife a few days after the birth of their only child, a daughter.

The foregoing sketch will have indicated how much Sir Rubert Boyce accomplished in the brief span permitted him. In 1906 he was created a Knight Bachelor for his services to tropical medicine. In figure he was small, fair, light, and active. He took a lively interest in arts of decoration and design. His house contained interesting pieces of old furniture and a large collection of fine Persian tiles. He entertained with wide hospitality friends and visitors from all parts of the world.

Strenuous, impetuous, sometimes intolerant of opposition, he had tact, humour, and good nature as well as decision and shrewdness. His views were bold and imaginative. Constantly obliged to work through committees, he always remained somewhat rebellant against the delays inherent to that system and procedure. Many of his most valuable and farthest reaching steps on behalf of his University and the Tropical School were taken and their business almost completed before his Committee had become formally aware that he had moved. His methods frequently came as electric shocks to those accustomed to ways more sedate. Financial obstacles seemed to present no difficulty to him where he felt an aim desirable. His activity not rarely exposed him to keen antagonism. He met this with various moods, but it never troubled him much. He won with curious facility the sympathy and

confidence of men of business and affairs. He made the pursuit of science intelligible to them in the same way as it was to himself. In council with actual men of science he was less effective. His gifts appealed to them less; his little weaknesses were of a kind particularly evident to them. In his earlier years he gave much promise as an investigator in scientific pathology. In 1902 the Royal Society elected him a Fellow. But he was already then too engrossed in organisation and administration to contribute much further to original research. His work for the expansion of his University and its School of Tropical Medicine absorbed him more and more. They precluded concentration of his mind on other problems. Embarked upon propagandism the temperament attaching to that shifted his mental key unsuitably for the prosecution of exact research. His own interests often suffered from his devotion to public business. His name should be remembered as an apostle preaching the importance of applied science successfully to the laity of his time. It will assuredly remain honoured in the University he so devotedly helped to raise; so also in that School of Tropical Medicine which grew from his inspiration. That School's success was the great aim and reward of all his later life. When the history of the university movement in England at close of last century and beginning of this comes to be written his should be a name of prominence in more than one of its pages. In any history of the development of tropical medicine his place as an organiser and a leader must be among the foremost in an epoch-making time. C. S. S. (September, 1911).

SIR FRANCIS GALTON, 1822—1911.*

Sir Francis Galton, Knight, traveller, meteorologist, pioneer in the science of heredity, and founder of the school of "Eugenics," was born at Birmingham on February 16, 1822. He was the youngest member of a family of four daughters and three sons born to Samuel Tertius Galton (1783—1844) and his wife, Frances Anne Violetta (1783—1874), daughter by the second marriage of Dr. Erasmus Darwin (1731—1802), the philosophical poet and man of science. In recording the life of one who devoted himself so largely to the study of heredity (a word imported into the English language by Galton himself), it is natural to look to his ancestry as explanatory of his great intellectual powers. In every case of conspicuous ability such an inquiry might, indeed, be of interest, but it would frequently be impossible to attain any such degree of completeness as is possible in the present case.

The Galton family was probably originally settled at Galton, in Dorsetshire, and they were certainly inhabitants of Somersetshire in the seventeenth century, but the first to move to the neighbourhood of Birmingham was Francis Galton's great-grandfather. The family belonged to the Society of Friends, and, like many other Quakers, they were keen and active men of business. In their case the business was that of gunsmiths and ultimately of bankers, and in these pursuits considerable fortunes were amassed.

Many of the family, and of the Barclays with whom they intermarried, were remarkable men and women. Amongst those known beyond the local and family circles were Sir Ewen Cameron of Lochiel (1629—1719), Robert Barclay (1648—1690), the Quaker apologist; Galton's great-uncle, Robert Barclay Allardyce, better known as Captain Barclay (1779—1854), and celebrated for his great feats of endurance and strength; and his aunt, Mary Anne Schimmelpenninck (1778—1856), a well-known writer in her day.

On the maternal side, his mother was daughter of Dr. Erasmus Darwin, and he was therefore first cousin, of the half blood, to Charles Darwin, the well-known naturalist. His grandmother, the second wife of Dr. Erasmus Darwin, was the widow of Colonel Edward Chandos Pole, of Radbourn, Derbyshire. Her mother's name was Collier, and it may be asserted with some degree of confidence that she was a natural daughter of Charles Colyear, second Earl of Portmore (1700—1785), a member of a remarkable family.† It would be out of place to go into further detail here, but enough has been said to show that Galton's ancestry comprises more than a common allowance of remarkable men and women.

After attending at several small schools during his childhood, Galton was

* Sources—'Memories of my Life,' by Francis Galton (Methuen, 1908); personal knowledge, and private information. A life is being written by Prof. Karl Pearson, F.R.S.

† See article "Colyear, Sir David," 'Dict. Nat. Biog.'

sent to King Edward's School at Birmingham. He describes his time there as a period of stagnation, for he had little taste for the purely classical teaching then customary, and had no opportunity of obtaining other kinds of instruction which he would have eagerly embraced. As it was intended that he should follow the medical profession he left school early, and after some preliminary apprenticeship to medical men in Birmingham he entered for a year's study at the medical school of King's College, London.

In 1840 he made a rapid tour to Vienna, Constantinople, and Smyrna. Such a journey was not at that time nearly as easy as it is now, and it is only mentioned as indicating his early desire to travel off the beaten track. In October of the same year he entered Trinity College, Cambridge. At Cambridge he formed friendships with many men who afterwards became famous, and he considered his University career to have been of the greatest service to him in promoting his intellectual growth. He read mathematics with the celebrated tutor, William Hopkins, and he obviously had a considerable aptitude for that branch of study. However, a severe illness during his third year at Cambridge made it impossible for him to persevere with this course of reading, and he proceeded to take the Ordinary or "Poll" degree. Throughout his life he had a warm affection for his University, and amongst the honours which he appreciated most highly in later life was his election in 1902 to an honorary fellowship at Trinity College.

In 1844, just after Galton had taken his degree, his father died, and under the will he found himself in possession of means ample enough to permit him to abandon the contemplated medical profession and to give rein to his aspirations for travel.

Accordingly in 1845 he went up the Nile as far as Khartum and afterwards travelled in Syria. Such a journey was at that time an adventurous one, and it served in his case as an incentive to the exploration which he undertook some years later. On his return from the East he gave himself from 1845 to 1850 to the sporting pursuits of a country gentleman, but these amusements did not suffice to satisfy his ambition. He had become a member of the Royal Geographical Society, and had in that way made the acquaintance of many distinguished travellers. Fired by their example, he determined on making an exploratory journey at his own expense, and after considering for some time whither he should go, he fixed on Damaraland as the place of travel. Damaraland is now German territory and is fairly well known, but at that time it was completely unexplored. He started inland from Walfish Bay and penetrated far into the interior, meeting with many dangers and hardships on the way. An interesting account of this journey is contained in his work 'Tropical South Africa,' published in 1853, and the importance of his daring exploration was recognised by the award of medals by the English and French Geographical Societies.

It was in 1853, and thus not very long after his return, that he married Louisa Jane, daughter of George Butler, Dean of Peterborough and previously Headmaster of Harrow School. The marriage was a singularly

happy one, but unfortunately they had no children. Mrs. Galton died at Royat in 1897, after a long period of ill-health. After her death one of her nephews lived with Galton for a time, and subsequently one of his own great-nieces was his companion up to his death.

After his African journey Galton was regarded as amongst the leading explorers of his time, and he played an important part in the work of the Royal Geographical Society during many years, indeed until increasing deafness prevented him from being a useful member of the Council. He was elected a Fellow of the Royal Society in 1856, and often served also on the Council of that body.

Whilst in Africa he had been struck by the waste of energy incurred by the fact that every explorer has to learn by bitter experience the numerous devices required for his safety and comfort, and he thought that much of this waste might be obviated if the experiences of travellers could be shortly set forth. He accordingly conceived the idea of collecting hints for travellers derived not only from his own experience in Africa, but also from that of others in widely different latitudes. The result was a small book published in 1855 entitled 'The Art of Travel.' It has since been through several editions and is a valuable *vade-mecum* for the explorer. It is much more than a dictionary of artifices to be employed in emergencies, and the present writer has found it very interesting reading.

After their marriage Mr. and Mrs. Galton settled in London, ultimately at 42, Rutland Gate, Hyde Park, and went much into Society, especially in literary and scientific circles. His powers as a conversationalist and ready humour, seconded by Mrs. Galton's sympathetic nature, rendered them charming hosts and they were universally popular.

The African journey had tried Galton's health severely, and he reluctantly felt himself compelled to forego further exploration, but he and his wife travelled extensively in Europe, and he became an enthusiastic mountaineer and member of the Alpine Club. There remains but little more to be recounted as to the social side of his life. He gradually became very deaf, and this cut him off much from the enjoyment of general society, but only in the last year of his life he learned of the existence of a microphonic form of ear-trumpet which restored his power of hearing to a marvellous extent and contributed greatly to his pleasure. During the last four or five years he became very infirm in body, although his intellect remained as bright as ever.

A portrait in water-colour, by O. Oakley, of Galton at the age of 22, and another in oil in later life by C. W. Furse, are in the possession of his nephew Edward Galton Wheler at Claverdon Leys, Warwick. A copy of the latter by F. W. Carter hangs in the Hall at Trinity College, Cambridge. There is a bronze bust of him dated about 1909, and executed by Sir George Frampton, at University College, London.

In 1908 he published an amusing and interesting account of his experiences entitled 'Memories of my Life,' which has served to furnish

much of this present article. This work gives in an appendix a list of all his writings up to 1908.

He received many other recognitions of his scientific eminence by public bodies, besides those already mentioned. Thus in 1886 he was awarded by the Royal Society one of the annual Royal Medals; in 1891 he became Officier de l'Instruction Publique de France; in 1894 and 1895 he received the honorary doctorates of Oxford and of Cambridge; in 1901 and 1902 he received the Huxley Medal of the Anthropological Institute and the Darwin Medal of the Royal Society; in 1908 he was awarded the special medal of the Linnæan Society, struck to celebrate the fiftieth year since the presentation to that Society of the celebrated papers by Darwin and Wallace, which were the prelude to the publication of the 'Origin of Species.' Finally in 1910, only two months before his death, he received the highest award of the Royal Society, namely, the Copley Medal, but he was too infirm to receive it in person from the hands of the President. He received besides the honour of knighthood by patent on the occasion of the celebration of the birthday of King Edward VII in 1909. All these honours came to him very late in life, and the delay is to be attributed to the very originality of his researches, which did not fit easily into the numerous compartments into which scientific investigation has naturally come to be divided.

During his later years it was his habit to leave London during the winter, and he died of acute bronchitis on January 17, 1911, at Grayshott House, Haslemere, a house which he had taken for the winter months. He was buried on January 21, at Claverdon, near Warwick, in the family vault. His will contained some very remarkable provisions, which will become more intelligible when a sketch has been given of his scientific career.

Galton bore his full share in the administrative side of scientific enterprise. Thus from 1863 to 1867 he was the General Secretary of the British Association for the Advancement of Science, a body whose functions it is unnecessary to explain in these pages. It is well known that the success of that Society depends in a very great degree on the activity of the Secretary, and in his case the Council had made a good choice. Besides this he was four times a Sectional President, and twice he felt himself compelled to decline invitations to become President on account of his deafness and failing strength.

In 1863 Galton published an important book entitled 'Meteorographica, or Methods of Mapping the Weather.' It was already known at that time that storms consist of a "cyclonic" motion of the air round a region of low barometric pressure, and that the circulation is counter-clockwise in the northern hemisphere and clockwise in the south. In this work he pointed out that the interstices between cyclones are filled in by systems, to which he gave the name, now universally adopted, of "anticyclones," in which the circulation takes place round a region of high pressure and is clockwise in our hemisphere. He pointed out that the anticyclonic systems are of

equal importance with the cyclones for an adequate apprehension of the causes of the variability of weather. He thus completed the basis of the system of weather forecasting which is now in operation over the civilised world. At a later date he also did much to formulate succinct methods of recording the multifarious results of meteorological observation.

This meteorological discovery doubtless explains how it came about that Galton was intimately associated with FitzRoy's early attempts to organise at the Board of Trade a meteorological service in this country, and it led to his membership from 1868 until 1900 of the Meteorological Committee (and of the subsequent Council), the governing body of the Meteorological Office. His position in meteorology had previously led to his association with the work of Kew Observatory, an institution initiated by General Sir Edward Sabine for magnetic and meteorological observation, and for the testing of instruments of precision. He was a member of the governing Committee from soon after its foundation, and Chairman from 1889 to 1901, in which year the Observatory became the nucleus of the National Physical Laboratory subsequently moved to Bushey. In this connection it may be mentioned that he did much to promote the efficiency of the institution, but we must refrain from going into details on this head.

But meteorology did not nearly suffice to occupy Galton's active mind, for already in 1865 he was occupied with those researches with which his name will always be associated. His investigations into the laws of heredity, to which we shall refer more in detail hereafter, led him to perceive the lamentable deficiency of tabulated data concerning human attributes. He therefore initiated an anthropometric laboratory at the International Health Exhibition of 1884. In this laboratory, statistics were collected as to the acuteness of the senses, the strength, weight, and dimensions of a large number of people. It might be tedious to recount all his work in devising instruments of measurement, in organisation, and in inducing others to work for him, and it may suffice to say that the outcome has been the collection of a mass of facts previously unattainable.

The impulse given through the collection of these anthropometric data, and afterwards by the publication in 1889 of his work 'Natural Inheritance,' gave the force which moved Weldon and Karl Pearson to undertake their far-reaching investigations. Thus the anthropometric laboratory at the Health Exhibition may be considered as the forerunner of the Biometric Laboratory subsequently founded at University College, London.

Amongst the data collected by Galton were impressions, made with printer's ink, of the fingers of a very large number of persons. It occurred then to Galton that such impressions might serve as a means of identification. Sir William Herschel had wished to use them for the identification of criminals in India, and Dr. Faulds had made a similar suggestion in this country, but there remained much laborious work for Galton to do. Proofs more decisive than any previously furnished had to be obtained that the finger-prints are permanent from youth to old age, that no two are exactly

alike, and that the patterns are susceptible of arrangement according to types and classes in such a way as to render it possible to construct a dictionary of finger-prints, whence an individual who has left a mark may be surely identified. All this he did, and the method is now in successful use in the criminal departments of every civilised country.

It is due to Galton, far more than to any other man, that many attributes of man, which at first sight appear only susceptible of qualitative estimation, have been made reducible to exact measurement. Some people have thought that some of his ideas were elaborate jokes, and, indeed, he himself enjoyed the humorous side of his attempts as much as anyone. But such a view would be quite erroneous, for it will be perceived on closer scrutiny that he was always trying—and generally successfully—to measure something which might, perhaps, be regarded as beyond the scope of an exact estimate. Measurement is the soul of science, and he was thus carrying the accuracy of scientific investigation into new fields. Thus he made a beauty-map of England and Scotland, showing the geographical distribution of good looks in the population, and he devised the method of composite photographs, in which each member of a group of persons made an equal impress on the resulting portrait. In this way family or other resemblances were given concrete shapes. He tried also to register the individualities of faces, while annulling their common features, but the attempt did not lead to any intelligible conclusions and was a failure.

Galton also made important and very original contributions to Psychology. It was thought by earlier investigators that if they could discover by introspection how their own minds worked, they would have solved the general problem of the working of the human intellect. But Galton showed that different minds work in different ways, and, for example, that visual images play a large part with many people, but not so with others. In this connection he investigated the pictures of scenes recalled in memory, as to illumination, definition, colouring, and as to other peculiarities. Akin to this was an inquiry into visions seen by the sane, which he found to be much more frequent and realistic than is generally supposed to be the case. A curious example, of a somewhat analogous character, is afforded by the visual patterns or pictures associated in many minds with numbers. He also experimented on the senses of taste and smell, on the power of accurately estimating weight by the muscular sense, on the judgment of experts in guessing the weights of cattle, and on other such matters too numerous to mention. This mere catalogue of highly original investigations, and the fact that he was the first man in England to make psychometric experiments and to publish the results, show that Galton deserves a high rank amongst experimental psychologists, and yet his investigations were merely collateral to the main line of his work.

When in 1859 the 'Origin of Species' was published by his cousin, Charles Darwin, Galton became at once a convert, and began to reflect deeply on the problems of inheritance, especially as applicable to the human

race. He was impressed by the fact that many of those who obtained distinction in the University at Cambridge were related to others who had been similarly distinguished at earlier dates. He therefore made a series of statistical inquiries as to the heritability of genius of all kinds. From first to last these investigations extend over a period of nearly forty years, and are to be found embodied in his works: 'Hereditary Genius,' 1869; 'English Men of Science,' 1874; 'Human Faculty,' 1883; 'Natural Inheritance,' 1889; and 'Noteworthy Families,' 1906. These works establish beyond any doubt the inheritance of mental capacity, as well as of all other physical characteristics.

Such investigations as these necessarily brought before him the fundamental principles of statistics, and although his mathematical equipment was insufficient to enable him to treat his many problems with completeness, yet his grasp of principles enabled him to obtain a remarkably clear insight into that difficult subject. In the hands of Karl Pearson and of others, the impulse given by Galton has led to the formulation of new statistical methods, of which much use has been made in the study of heredity. It would be out of place, in the present article, to give even an outline of such a technical subject, and it must suffice to say that it is now possible to assign a numerical value for the average degree of relationship or "correlation" between any pair of attributes in a large population. In close relationship to the theory of correlation is Galton's conclusion that the *average* contribution to each individual is $\frac{1}{4}$ from each parent, $\frac{1}{16}$ from each grand-parent, and so on for the remoter generations. This conclusion remains but little shaken by the copious criticisms to which it has been subjected by many other investigators.

It may be well to mention, in passing, that Galton made some interesting experiments on the breeding of rabbits, with a view of testing Darwin's theory of pangenesis. He argued that a copious transfusion of blood between two individuals of different varieties should carry with it some of the reproductive "gemmules," and that the offspring should show some of the characteristics of the variety whose blood had tainted the parents. But the result was negative, for no effect could be traced.

The conviction that all attributes are heritable naturally led Galton to reflect on the improvement of the human race which might be effected by breeding from the best and restricting the offspring of the worst. He gave the name of Eugenics to this branch of study, and it is probable that it is through Eugenics that he will always be best known to the larger public which cares little for science, but will attend to matters touching every member of the human race. Careful breeding might produce results as remarkable in mankind as it has done with domestic animals, but Galton was under no illusion as to the rapidity with which favourable results will be attained. He foresaw that, in the present condition of society, immediate measures were impracticable, except perhaps in restraints to the breeding from idiots and the feeble-minded, and he thought that education in a knowledge

of the power of heredity would take several generations to permeate through all ranks of the community. Eugenics Societies have already been founded, and such considerable progress has been made that Galton's expectations may well prove to have been too pessimistic.

With the object of promoting investigation Galton initiated a Eugenics Office in 1905, and this led to the foundation of a Eugenics Laboratory in 1906 to be worked by Karl Pearson in connection with his Biometric Laboratory already referred to above. He further endowed a Research Fellowship and Scholarship in connection with these institutions. A quarterly journal, entitled 'Biometrika,' for the publication of researches had already been founded in 1901, and Galton was asked to be Consulting Editor.

He said of himself that he took "Eugenics very seriously, feeling that its principles ought to become one of the dominant motives in a civilised nation, much as if they were one of its religious tenets."* It has been shown that during his life he was the driving force of the movement, not only by his writings, but also by his endowment of research in this field. And after his death it was found that, subject to certain specific bequests, he had left his residual estate, amounting to about £45,000, for the foundation of a Chair of Eugenics in the University of London, with the expressed wish that Karl Pearson should become the first Professor, a wish which has since been fulfilled. The capital sum was as far as possible to be left intact for the maintenance of the Chair, and the necessary laboratory was to be provided in some other way. Since his death a subscription has been initiated for the latter purpose.

This large endowment will be of enormous benefit to the cause which Galton had so much at heart, and if his forecast of the future shall be fulfilled, he will rank not merely as a great investigator, but also as amongst the greatest of benefactors to mankind.

G. H. D.

* 'Memories of my Life,' p. 322.

JOHN HUGHLINGS JACKSON, 1835—1911.

JOHN HUGHLINGS JACKSON, whose death occurred on October 7, 1911, at the age of 76, had been a Fellow of the Society since 1878. By his death, English medicine, and neuro-pathology in particular, has lost one of its most original and illustrious exponents.

Hughlings Jackson was born in 1835 of a Yorkshire father and a Welsh mother, in the village of Green Hammerton, near Knaresborough, in the county of York. His early education was entirely provincial. He acquired a fair knowledge of French, but he never learnt German, and often lamented his inability to read treatises in this language at first hand.

As was the fashion in those days, he began his medical studies by becoming apprenticed to a practitioner—Dr. Anderson, of York—and attended lectures at the York Hospital Medical School, a small and unimportant institution. At this institution Sir Jonathan Hutchinson, Jackson's lifelong friend, also commenced his medical studies.

In 1855 Jackson entered St. Bartholomew's Hospital, where he became a pupil of Sir James Paget, then in the height of his fame as a clinical teacher. After six months' study at St. Bartholomew's, he passed his examinations for the qualifications of M.R.C.S. and L.S.A., and returned to York, where he was appointed House Surgeon to the York Dispensary, a post which he held for two years. It was during this time that he came under the influence of Dr. Thomas Laycock, afterwards Professor of Medicine in the University of Edinburgh.

Laycock was a man of extraordinary suggestiveness and almost prophetic insight. He and Jackson had many points in common, though in accuracy of clinical observation Jackson far surpassed him. But, like many other of his pupils, Jackson always freely acknowledged his great indebtedness to Laycock's brilliant and stimulating speculations.

In 1859 Jackson came to London with a recommendation to Sir Jonathan Hutchinson, who introduced him to London hospital work, and helped him much in his early career. Hutchinson has always properly taken credit for having "discovered" Jackson, and for having dissuaded him from giving up medicine, as he at one time seemed inclined to do ("The Late Dr. Hughlings Jackson: Recollections of a Lifelong Friendship," 'Brit. Med. Journ.,' December 9, 1911, by Sir Jonathan Hutchinson).

In 1860 he took his degree of M.D. at St. Andrews, and was admitted as a member of the College of Physicians in the following year. In 1864 he was appointed Assistant Physician at the London Hospital and Lecturer on Physiology at its Medical School. He was appointed full physician in 1874, and held the post till 1894, when he was placed on the Consulting Staff. Concomitantly with his duties at the London Hospital, Jackson also acted as Assistant Physician (1863), and ultimately (1867) as Physician, to the

National Hospital for the Paralysed and Epileptic till 1906, when he retired from the active staff as Consulting Physician. At the National Hospital in particular, Jackson found a rich field for his neurological studies, towards which he was largely directed by the personal influence of Brown-Séquard.

During his earlier years he spent much time in reporting for the medical journals cases of interest in the various metropolitan hospitals, and made the acquaintance of the members of the staff of most of these institutions.

Throughout the whole of his career as Physician to the London and National Hospitals Jackson was busy with his pen, and his contributions to the medical journals, lectures, etc., had amounted in 1902 to over 200 (*vide* Bibliography appended to Sir W. Broadbent's Hughlings Jackson Lecture, 'Brain,' vol. 26, 1903, p. 356, *et seq.*). Though frequently urged by his friends to publish in a collected form his numerous contributions to medical science, scattered in various journals, and practically inaccessible to the great majority of students, he always made some excuse, and would not allow anyone to edit them in case of any inaccuracy or misrepresentation, of which he had a horror.

His voluminous writings embrace clinical observations, biological and philosophical speculations. In the latter the influence of Herbert Spencer, of whom he was an intimate friend and admirer, is largely seen. There is much repetition and iteration of the dominant ideas which form the groundwork of his teaching.

His style is frequently obscure, owing to the numerous provisos and qualifications which he constantly introduced to prevent his being misunderstood. But a noteworthy feature in his writings is that he never failed to indicate any facts which seemed to contradict his own theories or explanations.

One of his earliest services to clinical medicine, and clinical neurology in particular, was his demonstration that optic neuritis in cerebral disease may be consistent with the most perfect vision. He strongly urged the routine use of the ophthalmoscope in medicine, pointing out its incalculable importance in diagnosis. Indeed, this cannot be over-estimated, for without the ophthalmoscope the neuro-pathologist would be deprived of his most potent instrument of investigation.

It is, however, with his studies of convulsions and his views on the evolution and dissolution of the nervous system that his name is best known and most firmly associated.

When Jackson began his clinical work, the views of Flourens on the unity and indivisibility of the cerebral hemispheres were prevalent in the schools. About the time (1861) when Broca had established the probable relationship between aphasia and lesion of the third frontal convolution of the left hemisphere, Jackson had already observed the relatively frequent association of loss of speech with right hemiplegia, and in 1864 he had already seen seventy such cases.

His observations of cases of unilateral right-sided convulsions, followed by temporary loss of power and loss of speech, led him to conclude that these were the counterpart of hemiplegia, and dependent, not on destruction, but discharging lesion, followed by exhaustion of the same region. "From the point of view of function there are two ways in which nerve tissue suffers. It may be destroyed, and then there is loss of function. It may be unstable, and then there is disorder of function-discharge. In the case of nervous organs representing movements, we have palsy from destruction, and we have irregular movements (chorea), occasional spasm, etc., from instability" ("A Study of Convulsions," 'Trans. Med. Grad. Assoc.,' vol. 3, 1870). The region affected he described vaguely as the convolutions related to the corpus striatum, the region supplied by the Sylvian artery. In reply to possible objections on the ground that the cerebral hemispheres were the organ of the mind, he remarks:—

"It is asserted by some that the cerebrum is the organ of mind, and that it is not a motor organ. Some think the cerebrum is to be likened to an instrumentalist, and the motor centres to the instrument; one part is for ideas, and the other for movements. It may then be asked, How can discharge of part of a mental organ produce motor symptoms only? I say motor symptoms only, because, to give sharpness to the argument, I will suppose a case in which there is unilateral spasm without loss of consciousness. But of what 'substance' can the organ of mind be composed, unless of processes representing movements and impressions; and how can the convolutions differ from the inferior centres, except as parts representing more intricate co-ordinations of impressions and movements in time and space than they do? Are we to believe that the hemisphere is built on a plan fundamentally different from that of the motor tract? What can an 'idea' (say, of a ball) be except a process representing certain impressions of surface and particular muscular adjustments? What is recollection but a revivification of such processes which, in the past, have become part of the organism itself? What is delirium, except the disorderly revival of sensori-motor processes received in the past? What is a mistake in a word, but a wrong movement, a chorea? Giddiness can be but the temporary loss or disorder of certain relations in space, chiefly made up of muscular feelings. Surely the conclusion is irresistible, that 'mental' symptoms from disease of the hemisphere are fundamentally like hemiplegia, chorea, and convulsions, however specially different. They must all be due to lack, or to disorderly development, of sensori-motor processes" ('Trans. St. And. Med. Grad. Assoc.,' vol. 3, 1870).

Jackson's views as to the constitution of the cerebral hemispheres and the existence of motor centres for the limbs, face, etc., in the Rolandic area were confirmed by Hitzig (1870) and subsequent experimenters. By his own careful observation of the onset, limitation and march of the spasms in cases of disease, he himself largely contributed to the exact localisation in man of the various motor centres experimentally determined on the lower

animals. He, however, never accepted the doctrine of exclusive localisation, holding that though each centre represents one set of movements in particular, yet it represents all more or less.

In the phenomena of disease Jackson always insisted on there being a positive as well as a negative element. This is the central idea of his explanation of the phenomena of insanity, post-epileptiform states, aphasia, etc., and is founded on his views as to the evolution of the nervous system.

These cannot be better given than in his own words:—

"Beginning with evolution, and dealing only with the most conspicuous parts of the process, I say of it that it is an ascending development in a particular order. I make three statements which, although from different standpoints, are about the very same thing. (1) Evolution is a passage from the most to the least organised, that is to say, from the lowest, well organised, centres up to the highest, least organised, centres; putting this otherwise, the progress is from centres comparatively well organised at birth up to those, the highest centres, which are continually organising through life. (2) Evolution is a passage from the most simple to the most complex; again, from the lowest to the highest centres. There is no inconsistency whatever in speaking of centres being at the same time most complex and least organised. Suppose a centre to consist of but two sensory and motor elements; if the sensory and motor elements be well joined, so that 'currents flow' easily from the sensory into the motor elements, then that centre, although a very simple one, is highly organised. On the other hand, we can conceive a centre consisting of four sensory and four motor elements, in which, however, the junctions between the sensory and motor elements are so imperfect that the nerve currents meet with much resistance. Here is a centre twice as complex as the one previously spoken of, but of which we may say that it is only half as well organised. (3) Evolution is a passage from the most automatic to the most voluntary.

"The triple conclusion come to is that the highest centres, which are the climax of nervous evolution, and which make up the 'organ of mind' (or physical basis of consciousness), are the least organised, the most complex, and the most voluntary. So much for the positive process by which the nervous system is 'put together'—evolution. Now for the negative process, the 'taking to pieces'—dissolution.

"Dissolution being the reverse of the process of evolution just spoken of, little need be said about it here. It is a process of undevelopment; it is a 'taking to pieces' in the order from the least organised, from the most complex and most voluntary, towards the most organised, most simple, and most automatic. I have just used the word 'towards,' for if dissolution were up to and inclusive of the most organised, etc., if, in other words, dissolution were total, the result would be death. I say nothing of total dissolution in these lectures. Dissolution being partial, the condition in every case of it is duplex. The symptomatology of nervous diseases is a double condition; there is a negative and there is a positive element in

every case. Evolution not being entirely reversed, some level of evolution is left. Hence the statement, 'to undergo dissolution,' is rigidly the equivalent of the statement, 'to be reduced to a lower level of evolution.' In more detail, loss of the least organised, most complex, and most voluntary, implies the retention of the more organised, the less complex, and the more automatic. This is not a mere truism, or, if it be, it is one that is often neglected. Disease is said to 'cause' the symptoms of insanity. I submit that disease only produces negative mental symptoms answering to the dissolution, and that all elaborate positive mental symptoms (illusions, hallucinations, delusions, and extravagant conduct) are the outcome of activity of nervous elements untouched by any pathological process; that they arise during activity on the lower level of evolution remaining" (Croonian Lectures "On Evolution and Dissolution of the Nervous System," 1884, 'Brit. Med. Journ.,' 1, 1884).

The three "levels" of evolution are thus described:—

"I will state what I believe to be the hierarchy of nervous centres, which accords with the doctrine of evolution. I used to arrange them according to the morphological divisions of the nervous system—spinal cord, medulla oblongata, etc. I now arrange them on an anatomico-physiological basis, that is, especially as to degree of indirectness with which each represents the body, or part of it. The lowest motor centres are the anterior horns of the spinal cord, and also the homologous nuclei for motor cranial nerves higher up; they extend from the lowest spinal anterior horns up to the nuclei for the ocular muscles. They are at once lowest cerebral and lowest cerebellar centres; hence lesion of them cuts off the parts they represent from the whole central nervous system. I am ignoring the cerebellar system (see *infra*, p. 6). The lowest centres are the most simple and the most organised centres; each represents some limited region of the body indirectly, but yet most nearly directly; they are representative. The middle motor centres are the convolutions making up Ferrier's motor region. These are more complex and less organised, and represent wider regions of the body doubly indirectly; they are re-representative. The highest motor centres are convolutions in front of the so-called motor region. I say 'so-called,' as I believe, and have urged for many years, that the whole anterior part of the brain is motor, or chiefly motor. I speak more in detail of this in another lecture. The highest motor centres are the most complex and least organised centres, and represent widest regions (movements of all parts of the body) triply indirectly; they are re-re-representative. That the middle motor centres represent over again what all the lowest motor centres have represented, will be disputed by few. I go further, and say that the highest motor centres (frontal lobes) represent over again, in more complex combinations, what the middle motor centres represent. In recapitulation, there is increasing complexity, or greater intricacy of representation, so that ultimately the highest motor centres represent, or, in other words, co-ordinate, movements of all parts of the body in the most special and

complex combinations. It is needless to give the scheme of sensory centres. The main conclusions are (1) that the highest (chiefly) sensory centres—parts behind Ferrier's sensory region—and also the highest (chiefly) motor centres—parts in front of the so-called motor region—make up the physical basis of consciousness; and (2) that just as consciousness represents, or is, the whole person psychical, so its basis (highest centres) represents the whole person physical—represents impressions and movements of all parts of his body, in old-fashioned language, the highest centres are potentially the whole organism. States of consciousness attend survivals of the fittest states of centres representing the whole organism" (*Ibid.*).

As to his highest levels and their situation in the brain his views do not claim to be more than speculations, and much will have to be done before they can be accepted as of higher value.

It is of interest that his views as to the function and mode of action of the cerebellum have been in all essentials confirmed by recent experimental research. He says:—

"All the muscles of the body are innervated both by the cerebrum and cerebellum, but in an inverse order. The cerebellum regulates the muscular contractions necessary for our attitudes in space, while the cerebrum regulates the contractions necessary to effect all changes of attitude which are made in response to successive impressions occurring in time. Speaking broadly, then, the cerebellum regulates continuous or tonic muscular contractions. It will be seen, therefore, that every combined muscular adjustment necessitates the co-operation of both these organs; no change of attitude can be effected by the cerebrum except in so far as a certain attitude was previously maintained by the cerebellum, and no steady movements can be produced by the alternate contractions of some groups of muscles, except in so far as other groups of muscles are maintained in a state of continuous contraction. Hence it may be inferred that all movements of the body are co-ordinated both in the cerebellum and the cerebrum."

He ingeniously explained many of the phenomena of disease associated with rigidity or contracture, such as paralysis agitans, hemiplegic and paraplegic contracture, by unantagonised cerebellar influx, owing to cessation or diminution of the influence of the cerebral hemispheres.

The above extracts convey only a meagre sketch of the chief fundamental principles which he applied to the elucidation of the phenomena of disease with so much originality and fruitfulness.

Jackson was a bad teacher in the ordinary sense, and lectured over the heads of the rank and file of his students. Yet, in spite of all this, there was never any unseemly behaviour in his class, such as occurred in that of some of his colleagues, or wherever a teacher is not *en rapport* with his pupils. Though he was essentially unpractical in a worldly sense, no one took liberties with him, and he enjoyed the reputation of being a genius, and on a higher level than ordinary men. He was not only revered, but beloved by all with whom he came in contact. He was utterly devoid of self-seeking.

In argument he was as courteous and considerate to the merest tyro as to the most eminent of his professional colleagues. He was of a shy, retiring disposition, grave, and in appearance much older than his years, and was familiarly known to his colleagues as "the Sage of Manchester Square." Sitting absorbed in thought in the corner of his landau, as he drove about on his professional rounds, he was a familiar figure in the West End.

Though serious in aspect, he had a fund of dry humour, and enjoyed a joke, even at his own expense. He was easily bored, and would take a play at the theatre in two or more instalments, necessitating separate tickets, rather than sit out the whole at once. When dining with his friends, which he seldom did, he would not unfrequently get up, beg to be excused when a certain hour came, at whatever stage of the proceedings. He was not fond of foreign travel, but liked to take holidays driving about the country in his carriage. He had little or no artistic perception, and this, as Dr. Buzzard has remarked ('Brit. Med. Journ.,' Oct. 14, 1911), probably acted prejudicially on his style of composition.

He had no recreations beyond novel reading, which he indulged in to a large extent. Increasing deafness in the later years of his life caused him to keep aloof from scientific meetings and from society in general, so that he became more and more of a recluse.

Childless himself, he was passionately fond of children, and delighted to bring toys to the children of his colleagues, who all loved and trusted him with their confidences. He married his first cousin, to whom he was devotedly attached, and her death, over thirty years before his own, was an irreparable loss to him.

Besides a world-wide reputation among his professional brethren, Jackson received many honours and marks of affectionate esteem from his colleagues and pupils. He was elected to the Fellowship of the Royal Society in 1878. He was F.R.C.P. (Lond.) and Hon. F.R.C.P.I., LL.D. Edinburgh and Glasgow, D.Sc. of Leeds, and Hon. M.D. of the University of Bologna, an honour from abroad which gave him special pleasure. He delivered in succession the Gulstonian (1868), Croonian (1884), and Lumleian (1890) Lectures to the Royal College of Physicians.

The Neurological Society, of which he was the first President, founded the Hughlings Jackson Lectureship in his honour, and he delivered the first lecture of the series himself in 1897 on "The Relations of Different Divisions of the Cerebral Nervous System to One Another and to Parts of the Body." The second lecture was delivered in 1900 by Prof. Hitzig, on "Hughlings Jackson and the Cortical Motor Centres, in the Light of Physiological Research" ('Brain,' vol. 23, 1900).

When he retired from the active staff of the London Hospital, he was presented with his portrait (Calkin) by his colleagues and admirers at home and abroad "in recognition of their esteem and admiration of his great services to the London Hospital Medical College, his distinguished position in the profession, and the advances he effected in medical science by his

laborious investigations and profound insight into diseases of the nervous system." This portrait is now in the possession of the Royal College of Physicians.

A marble bust (an excellent likeness by H. Hampton), subscribed for by his colleagues, graces the Entrance Hall of the National Hospital for the Paralysed and Epileptic, and reminds all who visit that institution of the great master who has passed away, but whose name will for ever remain enshrined in the annals of medical science.

D. F.

JOHN BEDDOE, 1826—1911.

Dr. John Beddoe was born at Bewdley in West Worcestershire on September 21, 1826, and belonged to an old yeoman stock in South Shropshire. He was a quiet, sickly child and his parents very wisely did not allow him to be taught to read or write, but these accomplishments he picked up for himself about his eighth year. All through his early life he was subject to attacks of illness which threw him back in his studies. As a boy he showed an interest in geography, and was greedy of knowledge and not without originality. Dr. Beddoe had a peculiarly observant mind and always endeavoured to account for what he saw; this was characteristic of him from his youth, and his mental alertness and sympathy for new ideas continued with him to the end of his long life. He graduated in medicine in Edinburgh and London, and during this period came into personal contact with a number of men already distinguished or who were to become so, many of whom made a lasting impression on the friendly and sympathetic student. His first paper, 'A Contribution to Scottish Anthropology,' was published in 1853. A year or so later he volunteered to join the Civil Hospital Staff, then being formed to supplement the undermanned Army Medical Service, which could not overtake its work at that stage of the Crimean War. In the course of his medical duties and during the little trips that he made he came into relation with various races and peoples of Eastern Europe and Western Asia, the characteristics of which he duly noted. In 1856–7 he travelled through a great part of Europe, gaining anthropological experience all the while. In 1857 Dr. Beddoe settled down to medical practice in Bristol, from which he retired in 1891. During all these years he led the quiet, busy life of a medical practitioner, winning the affection and esteem of a wide circle of

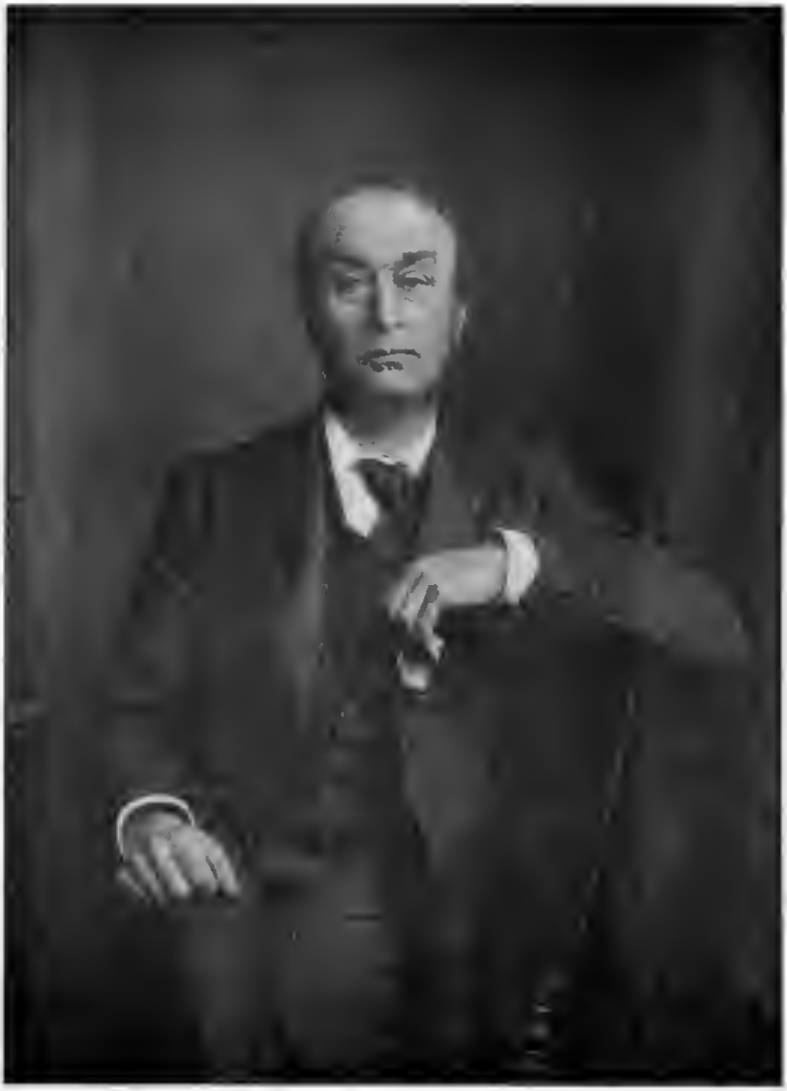
friends and fellow-townsmen. The monotony was broken by a few visits to the Continent and one to Australia. In 1910 he published a delightful and informing autobiography, entitled 'Memories of Eighty Years,' which should be read by every anthropologist as it throws many sidelights on the founders of the science and incidents in its history. Dr. Beddoe died on July 19, 1911, in the historic old house called the Chantry, at Bradford-on-Avon, where he had resided for ten years.

Dr. Beddoe's life roughly corresponds with the modern development of anthropology, and naturally he came into personal contact or entered into correspondence with most of those whose names are held in honour by students. The majority of anthropologists were then measuring skulls and exercising their ingenuity in devising new chords, arcs and angles, and the instruments wherewith to measure them, the heads of living individuals of diverse races being treated as far as possible in a similar manner. The shrewd Bristol doctor, who early in his medical career had applied his clinical training to the observation of the living, had stored his memory and note-books with observations of the physical and psychical characteristics of various races and peoples; though he made various investigations in craniology and osteology, mainly of the old inhabitants of these islands, his chief claim to fame will be as the pioneer and chief exponent of what may be termed "observational anthropology." It was he who first made statistical investigations upon the colour of the hair and eyes of European peoples. Owing to the observations of numerous Continental anthropologists on large numbers of conscripts and other groups of people we now have very definite information concerning the pigmentation and other characters of several European countries. Dr. Beddoe's data were compiled partly from statistics obtained from the 'Hue and Cry,' referring mainly to deserters from the army, and partly from his own observations, for the making of which he devised a very simple method. The main results of his investigations on the physical characters of the British people will be found in 'The Races of Britain: a Contribution to the Anthropology of Western Europe,' 1885, which still remains the only monograph on the subject. The book is an expansion of the memoir on 'The Origin of the English Nation,' for which he won in 1867 the prize of 100 guineas offered by the Council of the Welsh National Eisteddfod for the best essay on that subject. In 1891 Dr. Beddoe delivered the Rhind Lectures in Edinburgh, taking as his subject 'The Anthropological History of Europe.' They were published in 1893 in a small volume which cannot now be obtained. The treatment of the subject was less detailed and statistical than that of 'The Races of Britain,' but it constituted a valuable sketch of the physical anthropology of Europe, indeed it remained for several years the only one in the English language. A bibliography of Dr. Beddoe's papers and memoirs will be found in 'Man,' October, 1911, p. 152.

John Beddoe, M.D., LL.D., F.R.S., F.R.C.P.L., was Honorary Professor of Anthropology in the University of Bristol; Officier de l'Instruction Publique

(1re Classe); Vice-President and ex-President of the Royal Anthropological Institute; President of the Wiltshire Archæological and Natural History Society; Foreign Associate of the Anthropological Society, Paris; Corresponding Member of the Anthropological Societies of Berlin, Sweden, and Rome; Honorary Member of the Anthropological Societies of Brussels and Washington, and of the Imperial Society of Friends of Science, Moscow, etc.

A. C. H.



Sydney Ringer